

CLAIMS

1. A relay terminal for relaying communication signals from originator user terminals to destination user terminals, comprising:

5 means for storing relay-authorization-and-priority data for a plurality of said user terminals having respective identification codes;

means for simultaneously receiving communication signals sent from a plurality of said originator terminals for relay to a plurality of said destination terminals that are identified in said received communication signals, wherein said received signals include
10 identification codes for said originator terminals and identification codes for said identified destination terminals;

means for detecting said identification codes in said received communications signals;

means for processing said detected identification codes in combination with said
15 stored data to determine if immediate relaying of said received communication signals to respective said identified destination terminals is authorized; and

means for relaying said received communication signals immediately to only those of said identified destination terminals to which immediate relaying is authorized in accordance with said determination.

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2. A relay terminal according to Claim 1, further comprising:

means for updating said stored relay-authorization-and-priority data immediately in response to a received control message.

3. A relay terminal according to Claim 2, wherein said processing means are adapted for re-determining said immediate-relay authorization in accordance with said updated stored relay-authorization-and-priority data and to preempt at least some previously authorized signal relaying in accordance with said re-determination.

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4. A relay terminal according to Claim 1, wherein the processing means are adapted for processing said detected identification codes and said stored data in combination with geographical-position data for the relay terminal and the identified destination terminals to determine whether immediate relaying of said received communication signal to the respective identified destination terminals is authorized in accordance with the relative positions of the relay terminal and the identified destination terminals.

5. A relay terminal according to Claim 4, wherein the processing means are adapted for processing said detected identification codes and said stored data in combination with time-of-day data to determine whether immediate relaying of said received communication signals to respective said identified destination terminals is authorized in accordance with the time of day.

6. A relay terminal according to Claim 1, further comprising:
means for storing for delayed relay those received communication signals of which immediate relaying to respective said identified destination terminals is not authorized in accordance with said determination.

7. A relay terminal according to Claim 1, further comprising means for recording data indicative of the performance of the relay terminal with respect to the timing of relaying said received communication signals in relation the time of receipt of the respective communication signals by the relay terminal

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8. A relay terminal according to Claim 7, in combination with means for processing said recorded performance data to compile statistics for use in recomposing said stored relay-authorization-and-priority data.

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9. A relay terminal according to Claim 1, further comprising means for processing directional-position data associated with said destination terminals for defining beam paths for relaying signals to said destination terminals.

10. A relay terminal according to Claim 9, further comprising:

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means for applying frequency-hopping patterns to said received communication signals for said relay of said communications signals;

means for storing a library of algorithms and parameters for executing a plurality of frequency-hopping patterns; and

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means for selecting algorithms and parameters from said library that cause different frequency-hopping patterns to be applied for each simultaneous said receipt and relay of said communication signals.

11. A relay terminal according to Claim 1, further comprising:

means for applying frequency-hopping patterns to said received communication signals for said relay of said communications signals;

means for storing a library of algorithms and parameters for executing a plurality
5 of frequency-hopping patterns; and

means for selecting algorithms and parameters from said library that cause different frequency-hopping patterns to be applied for each simultaneous said receipt and relay of said communication signals.

10 12. A relay terminal according to Claim 10, wherein the selecting means are adapted for causing respectively different said frequency-hopping patterns to be applied to acquisition, identification and payload segments of the relayed communication signals.

13. A relay terminal according to Claim 1, further comprising means for causing
15 respectively different said frequency-hopping patterns to be applied to acquisition, identification and payload segments of the relayed communication signals.

14. A relay terminal according to Claim 1, wherein the relaying means are adapted for simultaneously relaying a plurality of communications signals and for
20 applying a different frequency-hopping pattern to each said simultaneously relayed communication signal.

15. A relay terminal according to Claim 1, further comprising means for processing directional-position data associated with a given said originator terminal to form a beam path for communications with the given originator terminal.

5 16. A relay terminal according to Claim 1, further comprising
means for deriving directional-position data associated with a given said originator terminal within an acquisition segment of a burst of a said communication signal received from a given said originator terminal; and
means for immediately defining a beam path in accordance with said derived
10 directional-position data to enable receipt of the remaining portion of said received signal burst within the formed beam path.

17. A relay terminal according to Claim 16, further comprising means for transmitting an error-corrected version of said received signal burst back to said given
15 originator terminal within the formed beam path.

18. A relay terminal according to Claim 1, further comprising

means for deriving directional-position data associated with a plurality of said originator terminals within acquisition segments of bursts of respective said communication signals simultaneously received from a plurality of said originator
5 terminals;

means for defining respective beam paths in accordance with said derived directional-position data to enable receipt of the remaining portions said received signal bursts within the respective formed beam paths; and

means for transmitting error-corrected versions of said received signal bursts back
10 to said plurality of originator terminals within said respective formed beam paths.

19. A relay terminal according to Claim 1, wherein the receiving means are adapted for simultaneously receiving a plurality of communication signals within a plurality of distinct beam paths from a plurality of different originator terminals; and

15 wherein the relaying means are adapted for simultaneously relaying communications signals within a plurality of distinct beam paths to a plurality of different destination terminals.

20. A relay terminal according to Claim 1, wherein the receiving means include a
20 plurality of receivers for respectively receiving said communication signals sent from said plurality of said originator terminals.

21. A communication system, comprising:

at least one said relay terminal according to Claim 1 disposed in a communication-satellite; and

at least one said relay terminal according to Claim 1 disposed in an aircraft;

5 wherein the processing means of each said relay terminal is adapted for processing said detected the same said identification codes in combination with the same said stored data to determine whether immediate relaying of said received communication signals to respective said identified destination terminals is authorized.

10 22. A relay terminal for relaying communication signals from an originator user terminal to identified destination user terminals, comprising:

means for storing relay-authorization data for a plurality of said user terminals having respective identification codes;

15 means for receiving a communication signal for relay to selected said destination terminals, wherein said received signal includes identification codes for said identified destination terminals;

means for detecting said identification codes in said received communications signal;

20 means for processing said detected identification codes and said stored data in combination with geographical-position data for the relay terminal and the identified destination terminals to determine whether immediate relaying of said received communication signal to respective identified destination terminals is authorized in accordance with the relative positions of the relay terminal and the identified destination terminals; and

means for relaying said received communication signal to the identified destination terminal at times when said relaying is authorized in accordance with said determination.

5 23. A relay terminal according to Claim 22, further comprising:

means for storing for delayed relay those received communication signals of which immediate relaying to respective said identified destination terminals is not authorized in accordance with said determination in accordance with the time of day.

10 24. A relay terminal for relaying communication signals from originator user terminals to identified destination user terminals, comprising: /

means for receiving a given communication signal sent from a given said originator terminal for relay to one or more selected said destination terminals;

15 means for deriving directional-position data associated with the given originator terminal by processing portions of the given signal received from the said originator terminal; and

means for processing the derived directional-position data associated with the given originator terminal to form a beam path for communications with the given originator terminal.

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25. A relay terminal for relaying communication signals from originator user terminals to identified destination user terminals, comprising: ✓

means for receiving a given communication signal sent from a given said originator terminal for relay to one or more selected said destination terminals;

5 means for deriving directional-position data associated with the given originator terminal within an acquisition segment of a burst of said received given communication signal; and

means for immediately defining a beam path in accordance with said derived directional-position data to enable receipt of the remaining portions of said received
10 signal burst within the formed beam path.

26. A relay terminal according to Claim 25, further comprising means for transmitting an error-corrected version of said received signal burst back to said given originator terminal within the formed beam path.

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27. A relay terminal for relaying communication signals from originator user terminals to identified destination user terminals, comprising: ✓

means for simultaneously receiving communication signals sent from a plurality of said originator terminals for relay to a plurality of selected said destination terminals;

20 means for deriving directional-position data associated with a plurality of said originator terminals within acquisition segments of bursts of respective said communication signals simultaneously received from a plurality of said originator terminals;

means for defining respective beam paths in accordance with said derived directional-position data to enable receipt of the remaining segments of said received signal bursts within the respective formed beam paths; and

means for transmitting error-corrected versions of said received signal bursts back
5 to said plurality of originator terminals within said respective formed beam paths.

28. A relay terminal for relaying communication signals from originator user terminals to identified destination user terminals, comprising: /

means for storing relay-authorization data and position data for a plurality of said
10 user terminals having respective identification codes;

means for receiving communication signals sent from a plurality of said originator terminals for relay to a plurality of selected said destination terminals, wherein said received signals include identification codes for said originator terminals and identification codes for said identified destination terminals;

15 means for deriving directional-position data associated with the selected said destination terminals by processing the stored position data; and

means for processing the derived directional-position data to form beam paths for relaying signals to the selected said destination terminals.

20 29. A relay terminal according to Claim 28, wherein the data deriving means are adapted for processing the stored position data for the plurality of said user terminals with geographical position data for the relay terminal to derive the directional-position data associated with the selected said destination terminals.

30. A relay terminal according to Claim 29, further comprising means for updating said stored position data by storing geographical-position data associated with at least one of said destination terminals.

5 31. A relay terminal according to Claim 30, further comprising means for detecting user-terminal geographical-position data in a said received communication signal for storage as said updated position data.

32. A relay terminal according to Claim 28, further comprising means for
10 updating said stored position data by storing geographical-position data associated with at least one of said destination terminals.

33. A relay terminal according to Claim 32, further comprising means for detecting user-terminal geographical-position data in a said received communication
15 signal for storage as said updated position data.

34. A relay terminal for relaying communication signals from originator user terminals to identified destination user terminals, comprising: /

means for applying frequency-hopping patterns to said received communication
20 signals for said relay of said communications signals;

means for storing a library of algorithms and parameters for executing a plurality of frequency-hopping patterns; and

means for selecting algorithms and parameters from said library that cause different frequency-hopping patterns to be applied for each simultaneous said receipt and
25 relay of said communication signals.

35. A relay terminal according to Claim 34, wherein the selecting means are adapted for causing respectively different said frequency-hopping patterns to be applied to acquisition, identification and payload segments of said relayed communication signals.

5 36. A relay terminal for relaying communication signals from originator user terminals to identified destination user terminals, comprising: ✓

 means for applying frequency-hopping patterns to said received communication signals for said relay of said communications signals;

10 wherein respectively different frequency-hopping patterns are applied to acquisition, identification and payload segments of a given said relayed communication signal.

 37. A communication network, comprising: ✓

15 a plurality of user terminals for transmitting and receiving communication signals;
 and

 a relay terminal for relaying communication signals from one or more said user terminals to one or more said user terminals;

 wherein individual said user terminals are adapted for simultaneously receiving
20 both a given signal transmitted directly from another user terminal and said given signal relayed by said relay terminal.

38. A user terminal for receiving communication signals, comprising:

a plurality of receivers for simultaneously receiving communications signals from
respectively different sources; and /

a router for routing the received communication signals to at least one output
5 device in accordance with a predetermined priority.

39. A user terminal according to Claim 38, wherein the receivers are respectively
adapted for receiving at least two different communications signals among one or more
network-specific signals, common information signals, alert signals and paging signals;
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wherein the predetermined priority is established among the one or more network-
specific signals, the common information signals, the alert signals and the paging signals.

40. A user terminal according to Claim 38, wherein one of the receivers is
15 adapted for receiving a given signal transmitted directly from another user terminal and
another of the receivers is adapted for receiving said given signal relayed by a relay
terminal.

41. Apparatus for deriving directional-position data associated with a given source of a transmitted communication signal, comprising: /

a plurality of differently disposed antenna elements;

5 a corresponding plurality of receivers respectively coupled to the different antenna elements for receiving a preamble portion of the transmitted communication signal within a given acquisition channel; and

a processor for (a) weighting the respective received preamble portions with different sets of vectors representing directions of arrival in said receipt of said preamble portion; (b) summing the weighted preamble portions for each set of vectors; and (c)
10 determining the directional position of the source in accordance with which set of vectors provides the highest sum of weighted preamble portions.

42. Apparatus according to Claim 41, wherein the receivers are adapted for receiving a transmitted signal that has frequency-hopped segments in the preamble
15 portion;

wherein the apparatus comprises means for dehopping the frequency-hopped segments; and

wherein the processor is adapted for weighting the respective received preamble portions with each of the different sets of vectors during each dehopped segment; and for
20 summing the weighted preamble portions for each set of vectors during each dehopped segment and for substantially all of the dehopped segments.

43. Apparatus according to Claim 42, further comprising means for detecting any interference at the frequencies of the respective frequency-hopped segments of the received preamble portions; and

means for nulling the dehopped segments received at a frequency at which interference is detected to minimize any distortion of the weighted sums that may be caused by said interference.

44. Apparatus according to Claim 41, wherein the vectors are time/frequency offset values.

45. Apparatus according to Claim 41, wherein the processor is adapted for determining the directional position of the source only when the highest sum of weighted preamble portions exceeds a predetermined threshold.

46. Apparatus according to Claim 41, wherein the receivers are adapted for simultaneously receiving within different acquisition channels the respective preamble portions of different said transmitted communication signals; and

wherein the processor is adapted for performing said weighting, summing and determining functions for the preamble portions received in each of the different acquisition channels.

47. A computer readable storage medium for use with a computer, wherein said medium programs the computer for performing at least one of the functions performed by the processors described in the detailed description, including at least the processing function recited in Claim 1.